Slide Set for Unit/Installation Training Applications*

Heat Illness Risk Management

* This slide deck was prepared for adaption and local use by units/installation personnel when conducting heat injury and illness prevention training.

The information presented in these slides and notes sections (as posted) has been approved by the Injury Prevention Program (IPP) of the Army Public Health Center (Provisional) (APHC (Prov)) as of March 2016. The IPP can be contacted at 410-436-4655 for technical consultation regarding heat illness prevention.

The requirement for Army Health Illness Prevention training is established by the U.S. Army Medical Command – the current (2015) policy memorandum is at https://www.us.army.mil/suite/doc/44976259.
This presentation material includes images from http://www.defenseimagery.mil/ as well as slides from US Army Safety Center website (https://safety.army.mil/.../hotweather/2007/Heat_Injury.ppt).

Additional information links and resources may be obtained from APHC (Prov) at: http://phc.amedd.army.mil/Pages/default.aspx

Heat Illness Risk Management

Presenters Name
Presenters Command
Local Contact Information

insert date

UNCLASSIFIED

Outline

- **Introduction and key terms**
- **Five steps of heat illness risk management**
- **Types of heat-related injuries:**
  - Exertional Heat Illnesses (EHI)
  - Water intoxication
- **Quiz questions**
- **Exercises**

Why you need to know about heat illness:

- Despite well documented and effective techniques for preventing heat illnesses, they continue to be a threat to Soldiers in training and combat.
- Each year an average of 2-3 Soldiers have died from heat stroke and more than 1000 Soldiers have developed a heat-related illness that required medical attention and/or lost duty time.
- Even mild heat illness and dehydration can *significantly* degrade performance

Key Terms

<u>Exertional Heat Illness (EHI)</u> refers to a spectrum of disorders (e.g., cramps, heat exhaustion, heat injury, heat stroke) resulting from total body heat stress. Primarily heat casualties are forms of ***heat exhaustion*** while more severe cases are ***heat stroke*** (potentially fatal).

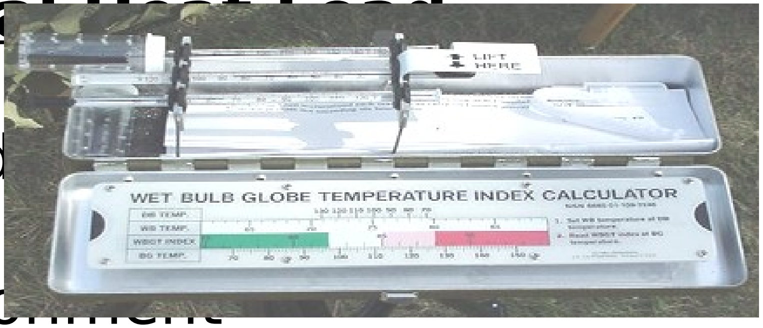
<u>Total Body Heat Stress</u> = **<u>Tota</u>**

individual =

1) Heat generated by the body (d
activity)

2) + Heat gained from the envir

3) - Heat lost in the environment



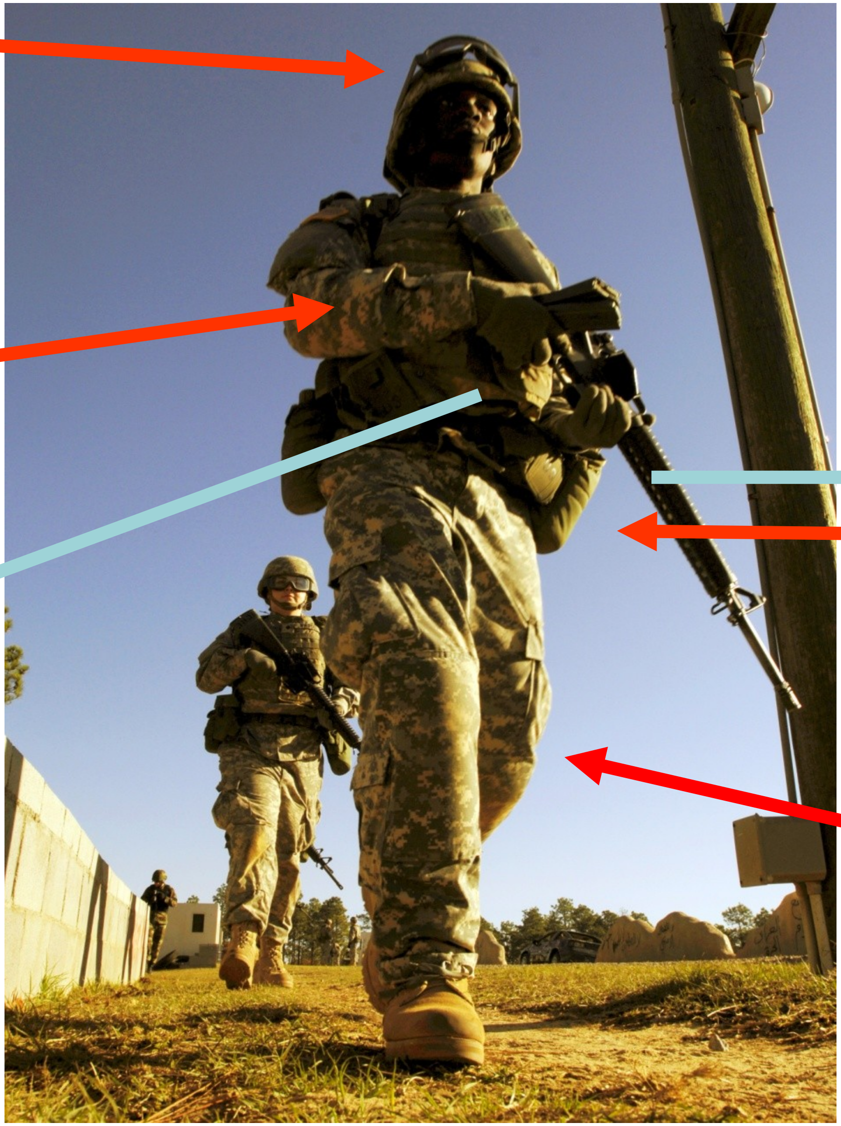
<u>Wet Bulb Globe Temperature</u>

Total Body Heat Stress

Solar radiation

Air Temperature & Humidity

Evaporation



Convection
(air currents)

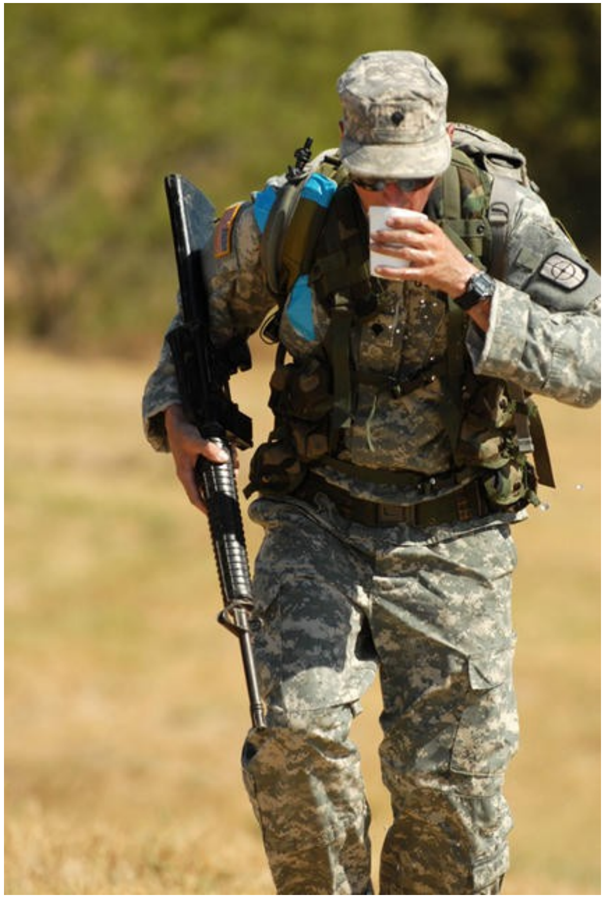
Metabolic (internal) Heat Production

WBGT categories

Category	WBGT, °F	WBGT, °C	Flag color
1	< 82	< 27.8	White
2	82-84.9	27.8-29.3	Green
3	85-87.9	29.4-31.0	Yellow
4	88-89.9	31.1-32.1	Red
5	=> 90	=> 32.2	Black

Five Steps of Heat Illness Risk Management

1. Identify hazards
2. Assess hazards
3. Develop controls
4. Implement controls
5. Supervise and evaluate



IDENTIFY HAZARDS:
Key Risk Factors for EHI

- **Environment**
  - Higher temperature
  - High humidity (WBGT)
- **Activities**
  - High exertion
  - Heavy loads/gear
  - Repeated strenuous days
- **Lack of Acclimatization**

- **Individual:**
  - Poor fitness (2 mi run > 16 min)
  - Body mass index (BMI) > 26
  - Age>40
  - Gender (female)
  - Minor illness
  - Medication (e.g. antihistamine, blood pressure, decongestants)
  - Alcohol past 24 hours
  - Prior heat injury
  - Skin rash, sunburn, or poison ivy
  - Blood donation (<3 days)
  - Sleep deprived
  - ***ALSO:*** Highly motivated

IDENTIFY HAZARDS:

Hot weather is a key risk factor for heat injuries

HOWEVER:

Heat illnesses can occur under green flag temperature conditions due to previous days' conditions and/or dehydration.

IDENTIFY HAZARDS:
Heat Illness Hazards are Cumulative

- **H** Heat category past 3 days
- **E** Exertion level past 3 days
- **A** Acclimation/ other individual risk factors
- **T** Time (length of exposure and recovery time)

A cluster of heat illnesses on prior days = HIGH RISK

IDENTIFY HAZARDS:
Lack of Acclimatization

- Body needs to adjust to environmental heat stressors prior to high exertion activities

- Acclimatization requires aerobic exercise in warm environment. Simply being outside doing normal activities is not sufficient

- Acclimatization guide on USAPHC
  Heat Illness Prevention webpage

ASSESS HAZARDS

- **Utilize the WBGT temperature index**
  - Add 5°F for rucksack or body armor
  - Add 10°F if in MOPP 4
- **Know your Soldiers**
  - Identify individual's at increased risk
- **Monitor and maintain hydration sta**
  - Assess morning and evening as well as during training
- **Factor in previous days' conditions & activities**
  - Consider temperature, activity levels, illnesses
- **Use a risk management matrix**

Example Heat Illness Risk Management Matrix

Risk Factors	Risk Level			
	0 points/circle Low Risk	**1 point/circle Medium Risk**	**2 points/circle High Risk**	**3 points/circle Extreme Risk**
Risk Management Worksheet	All controls implemented			Not all controls implemented
WBGT Add 5 F backpack or body armor	< Cat 1	Cat 1	Cat 2-3	Cat 4-5
Back-to-back Cat 5 days	0	1	2-3	>4
Heat Illnesses in past 2 days	0	Heat Cramps	Heat Exhaustion	Heat Stroke/ Death
Workload in past 2 days (see TR 350-29 workload classification chart)	Easy	Easy or Moderate	Moderate or Hard	Hard
Projected workload	Easy	Easy or Moderate	Moderate or Hard	Hard
Heat acclimatization days	>13	7-13	3-6	<3
Leader/NCO presence	Full Time	Substantial	Minimal	None
Cadre duty experience	18 months	7-18 months	1-6 months	<1 month
Communication System (tested at training site)	Radio and landline phone	Landline phone only	Radio only	None
Previous 24 hours sleep	>7 hours	5-7 hours	2-4 hours	<2 hours
Food/salty snacks every 4 hours	<4 hours	4-6 hours	6-7 hours	>7 hours
Onsite 68W/CLS and iced sheets (min. 8 single bed sheets/company in cooler)	Both iced sheets & Medic, EMT, or CLS	Only Iced sheets	Medic, EMT, or CLS	None
Add Circled Blocks with points/circle				

Total Score: 0-7 = Low Risk; 7-15 = Medium Risk; 16-24 = High Risk; 25-39

DEVELOP CONTROLS

- **Plan in advance:**
  - Estimate heat risk level 1 day prior
  - Adjust activity distances, durations, pace, and loads
    - Conduct high-intensity training in cooler morning hours
  - Ensure proper resources at appropriate lo

    - Functional WBGTs
    - Water/electrolytes
    - Ice sheets (in cooler filled 1/3 water, 2/3 ice
    - Medical: resources, locations, communication systems
- **Establish SOPs, train, and test Soldiers**
  - Heat Illness Prevention and Hydration cards and sunscreen to all
  - Place Heat Illness Prevention posters and urine guides in bathrooms, bulletin boards, DFAC, training areas, etc.
- **Identify how to monitor hydration & high risk**

Work/Rest Times and Fluid Replacement Guide

Heat Category	WBGT Index (ºF)	Easy Work Walking on hard surface, 2.5 mph, <30 lb. load; weapon maintenance, marksmanship training.		Moderate Work Patrolling, walking in sand, 2.5 mph, no load; calisthenics.		Hard Work Walking in sand, 2.5 mph, with load; field assaults.	
		Work/Rest *(minutes)*	***Fluid Intake*** *(quarts/hour)*	***Work/Rest*** *(minutes)*	***Fluid Intake*** *(quarts/hour)*	***Work/Rest*** *(minutes)*	***Fluid Intake*** *(quarts/hour)*
1	78º - 81.9º	NL	½	NL	¾	40/20 (70)*	¾ (1)*
2 (GREEN)	82º - 84.9º	NL	½	50/10 (150)*	¾ (1)*	30/30 (65)*	1 (1¼)*
3 (YELLOW)	85º - 87.9º	NL	¾	40/20 (100)*	¾ (1)*	30/30 (55)*	1 (1¼)*
4 (RED)	88º - 89.9º	NL	¾	30/30 (80)*	¾ (1¼)*	20/40 (50)*	1 (1¼)*
5 (BLACK)	> 90º	50/10 (180)*	1	20/40 (70)*	1 (1¼)*	10/50 (45)*	1 (1½)*

NL = No limit to work time per hour.

*Use the amounts in parentheses for continuous work when rest breaks are not possible. Leaders should ensure several hours of rest and rehydration time after continuous work.

This quidance will sustain performance and hydration for at least 4 hours of work in the specified heat category. Fluid needs can vary based on individual differences (± ¼ qt/hr) and exposure to full sun or full shade (± ¼ qt/hr).

Rest means minimal physical activity (sitting or standing) in the shade if possible.

Body Armor - Add 5°F to WBGT index in humid climates.

NBC (MOPP 4) - Add 10°F (Easy Work) or 20°F (Moderate or Hard Work) to WBGT Index.

CAUTION: Hourly fluid intake should not exceed 1½ qts. Daily fluid intake should not exceed 12 qts.

USAPHC

Approved for public release, distribution unlimited.

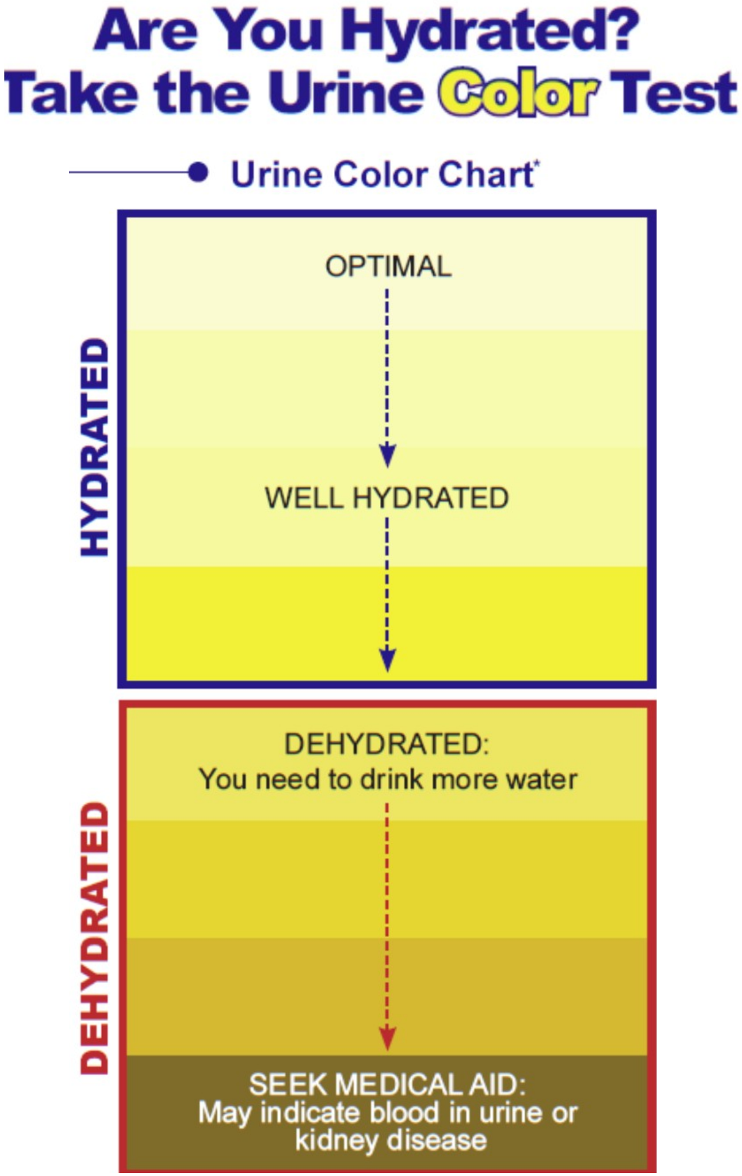
CP-O33-0415

NOTE: All fluids provide water, whether milk, fruit juice, etc.

See USAPHC Website for Heat Illness Prevention Products:

http://usaphcapps.amedd.army.mil/HIOShoppingCart/searchResults.aspx?hotlist=8

NOTE:
This card is a useful field tool but is not a definitive indicator of hydration status and not for clinical use. Urine color can be affected by certain food or medications. Urine color will take some time to change after consumption of fluids or after high physical activity



IMPLEMENT CONTROLS:
Monitoring Hydration and Personnel

- **Buddy system**

    - Assign Low risk to High risk personnel

- **Track high risk personnel and individual hydration status**

    Daily intake (1 knot/black bead per canteen)

    Use red beads for “at-risk” Soldiers

- **Place water at key points**
    - e.g., at land navigation objectives
- **Provide and monitor**
    - Electrolyte drinks
    - Meal intake

IMPLEMENT CONTROLS:
Change events to minimize heat load

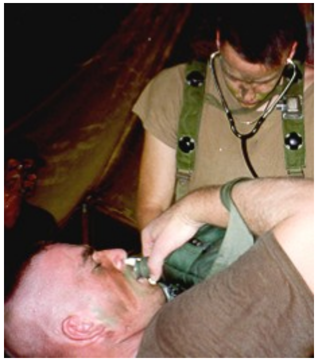
- Avoid back-to back strenuous days especially Category 4-5
- Modify time of day – complete
- Adjust Activity:
  - Wide spacing between Soldier
  - Reduce pace and/or distance
  - Breaks
  - Shade Soldiers whenever poss

- Reduce clothing and load:
  - Uniform
  - Backpacks, body armor, helmets, etc (training)
- Dump excess heat
  - Allow/provide field showers
  - Cool overnight temp (fans, air conditioning, cool

SUPERVISE AND EVALUATE

When controls fail, heat injuries occur!

- **Spot checks:**
  - Troops
  - Cadre/leaders
  - Medical



- **Be familiar with signs/symptoms of EHI**
  - Look for mild signs/symptoms ✉ stop from progressing
  - Take immediate action when EHI is observed or suspected
  - When in doubt, **call 911 and begin cooling!!**
- **If a heat injury occurs stop training and assess**

Recognizing Heat-Related Illnesses

Heat Exhaustion

- Dizziness
- Headache
- Nausea
- Weakness
- Clumsy/unsteady w
- Muscle cramps

Heat Stroke

- Profuse sweating
- Convulsions and chills
- Vomiting
- Confusion, mumbling
- Combative
- Passing out (unconscious)

Water Intoxication Hyponatre

- History of large water consumption
- Confusion
- Vomiting (liquid, no food)
- Convulsions
- Clear urine

Reacting to a Heat Illness/Casualty Event

- **MOVE** victim to cool location (e.g., shade, A/C car, building)
- **ASSESS** victim to determine type of EHI
  - Signs/symptoms
  - Hydration (knots in 550 cord) to check for hyponatremia
  - Risk level (red beads or risk factors)
  - Mental status (for heat stroke)
    - ***Designate single person to continue monitoring***
- **DECIDE** which EHI and take proper management approach
  - Heat Exhaustion: rest in shade, rehydrate
  - Heat Stroke: begin rapid cooling, evacuate immediately
  - Hyponatremia: evacuate immediately

Identify Exertional Heat Stroke – Perform a Mental Status Check

- Anyone can do a mental status check by asking the following questions
  - What is your name?
  - What month is it? What year is it?
  - Where are we/you?
  - What were you doing before you became ill?

Anyone who undergoes a mental status change, including loss of consciousness, as a result of exertion during warm weather will be assumed to be a heat stroke victim until determined otherwise by medical authority.

Heat exhaustion versus Heat Stroke Management

HEAT EXHAUSTION

- Rest Soldier in shade
- Loosen uniform/ remove head gear
- Have Soldier drink 2 quarts of water over 1 hour
- Evacuate if no improvement in 30 min, or if Soldier's condition worsens

HEAT STROKE

- If Soldier's brain isn't working correctly then **COOL** and **CALL!!**
  - Strip
  - Rapid cool (ice sheets)
  - Call for evacuation
- Continue cooling during transport
- Maintain same person to observe for mental change

General Evacuation Criteria

- Vomits more than once
- No improvement after 1 hour of rest and hydration
- General deterioration
- Mental status changes/confusion
- Loss of consciousness

Soldiers displaying any of these criteria may be suffering **heat stroke** rather than heat exhaustion

Any soldier who requires cooling with iced sheets should be evacuated to the ER

Pre-hospital care

- Ensure specific individual is assigned to continuously monitor
- Cooling is the priority- can reduce mortality from **50% to <5%**
  - Iced sheets (most effective) but also:
    - Drench with water
    - Fan
    - Shade
- Remove outer layers of clothing
- Rest with feet propped (helmet, sandbag, etc)
- If conscious, allow victim to *sip* cool water
- If unconscious, monitor airway and breathing

Rapid cooling (ice sheets)

- Except face, cover as much exposed skin as possible
- Also cover the top of the head
- When sheets warm up, put back into cooler and switch with other clean cold sheets
- Continue during evacu
- Maintain same observ

Medical Support Issues

- Know:
  - When to evacuate
  - Where to evacuate
  - How to evacuate
- Medical professionals train others:
  - Evacuation decision guidance
  - Cool down with ice sheets
- Carry adequate iced sheets
- Coordinate non-military ambulance support (garrison/off-post)
- Conduct tests to ensure 100%

Summary

- EHI remains a threat to Soldiers and the Mission
- 5 steps of heat illness risk manageme
- Recognize heat-related illnesses
  - EHI
    - Heat Exhaustion
    - Heat Stroke
  - Water intoxication
- Know what to do -

➢ Now some quiz questions and scenarios….

HEAT ILLNESS RISK MANAGEMENT

QUIZ QUESTIONS

1. What is heat load?
2. Which of the 3 parts of the WBGT is most significant?
3. How many (F°) are added to WBGT for body armor?
4. What drugs can increase risk of EHI?
5. What are 3 other personal risk factors for EHI?
6. Name 3 controls can be done to reduce risk of EHI?
7. What 2 things do you do to monitor High risk personnel?
8. What is the most severe form of EHI?
9. What is the most critical action for a suspect EHS

eat Illness Risk Management Exercise 1: FTX 8K FOOT MARCH

- **SITUATION**: A BCT company conducting an 8KM foot march at approximately 0700 (July). It is week 4. WBGT: **WBGT**: It is WBGT 3 (**Yellow**). It has been WBGT 4 for 2 preceding days.
- **UNIFORM/EQUIPMENT**: Soldiers were wearing their ACU with pants unbloused and rolled 2x, sleeves rolled 2x, combat boots, advanced combat helmet and ALICE pack (modified IAW with guidance).
- **EXERCISE/WORKLOAD**: Soldiers have been qualifying at the range for M16A2 rifle marksmanship and conducting physical training from 0530 to 0630 everyday during this week 4 of BCT.
- **SOP**: Installation SOP requires any uniform or POI changes to reduce the heat load to be made by Senior Leader on the ground.
- **SUPPORT**: Unit does not have organic medical support. Med Clinic is approx 2 miles away. Each platoon has CLS-trained Drill NCOs.
- **EVENT**: PVT Golf was on prescribed ENTEX for colds. PVT Golf fell down twice then collapsed at the 4km point. Unit cadre took his temperature via Thermoscan at 103º F. 1SG Hotel reached PVT Golf and noted symptoms were the same to those he had witnessed with his own father's heart attack. Cadre evacuated PVT Golf to the nearest clinic (1.6 miles away/ a two-minute drive) where PVT Golf received 2-IV's, required artificial respiration, and his temp rose to 108º F. Ice sheets were used and PVT Golf was evacuated by ground ambulance to an Army Community Hospital and was subsequently transferred to an Army Medical Center (AMC) later that day. His condition improved that day but developed signs of possible liver failure the next day and Med staff arranged for a liver transplant. On third day PVT Golf suffered a heart attack and was pronounced dead within the hour.
- **Conduct an AAR**.:
  - What actions IAW the Risk Management process should have been taken?

Heat Illness Risk Management Exercise 2: RIFLE RANGE

- **SITUATION**: An OSUT company is on a 5k march from the rifle range to the barracks at 1500 hours in a regular formation. Pace is 2.5 mph on a hard surface. It is Week 4.
- **WBGT**: It is WBGT 2 (**Green**). It has been WBGT 3/4 previous 3 days.
- **UNIFORM/EQUIPMENT**: Soldiers are wearing BDUs, patrol caps, web belts with canteens and ponchos, and rifles. Sleeves are down and pants are bloused.
- **EXERCISE/WORKLOAD**: Soldiers have been training all day since 0500. They took the PT test yesterday and the obstacle course the previous day.
- **SOP**: Installation SOP allows the Senior Leader on-the-ground to make any uniform or POI changes to reduce the heat load.
- **SUPPORT**: Unit does not have organic medical support (field ambulance and Medic/EMT). Ambulance service is provided by a local civilian hospital 20 minutes away. Each platoon has CLS-trained Drill NCOs.
- **EVENT**: Pvt Alpha wanders off into the tree line and is talking to the trees, mumbling incoherently. The Platoon NCO, SSG November, puts Pvt Alpha back into the marching formation at the head of the formation “to slow the march pace down.” Pvt Alpha wanders off again, talking to himself, unresponsive to questions.
- **Conduct an AAR**:

  - ❑ What actions IAW the Risk Management process should have been taken?
  - ❑ What actions should you as the senior leader on the ground take NOW?

Heat Illness Risk Management Exercise 3: TRAINING

- **SITUATION**: A BCT company was doing a 3k road march in a regular formation at 1400 hrs (June). Pace is 3.5 mph on an asphalt road. It is Week 2.
- **WBGT**: It is WBGT 2 (**Green**)(84° WBGT). It has been WBGT 2 the previous 3 days.
- **UNIFORM/EQUIPMENT**: Soldiers are wearing BDUs, patrol caps, body armor without plates, web belts with canteens and ponchos, and rifles. Sleeves are down and pants are bloused.
- **EXERCISE/WORKLOAD**: Soldiers have been training all day since 0500. Last 3 days have been classroom training.
- **SOP**: Installation SOP allows the Senior Leader on-the-ground to make any uniform or POI changes to reduce the heat load.
- **SUPPORT**: Ambulance service is provided by a local military hospital. Each platoon has CLS-trained Drill NCOs.
- **EVENT**: Pvt Bravo collapses and is unconscious for >5 minutes. The SGT Delta, the Platoon CLS, thinks it is a Heat Stroke and starts Rapid Cooling. Pvt Bravo regains consciousness after 5 minutes and appears ok. SGT Delta takes Pvt Bravo to the BN medic's office to get his opinion, but the medic is not in. SGT Delta then takes Pvt Bravo to the BDE medic to get her opinion, but she is not in. Finally, as Pvt Bravo's condition worsens, SGT Delta takes him to the hospital at 1700 hrs.
- **Conduct an AAR**.

  - ❑ What actions IAW the Risk Management process should have been taken?
  - ❑ What actions should you as the senior leader on the ground take NOW?

Heat Illness Risk Management Exercise 4: QUALIFYING

- **SITUATION**: BCT Soldiers are qualifying on the M16 at the weapons firing range. A Range Control Officer is in charge of the range.
- **WBGT**: It is WBGT 4 (**RED**). It has been WBGT 4 the previous 3 days.
- **UNIFORM/EQUIPMENT**: Soldiers are wearing BDUs, helmets, body armor with plates, and rifles. Sleeves are rolled up and pants are bloused.
- **EXERCISE/WORKLOAD**: Soldiers have been in classroom training all day indoors in A/C since 0500.
- **SOP**: Installation SOP allows the Senior Leader on-the-ground to make any uniform or POI changes to reduce the heat load.
- **SUPPORT**: Ambulance service is provided by the local military hospital. An ambulance with a Medic/EMT is on the range.
- **EVENT**: PVT Echo, goes to the SGT Charlie, the Drill Instructor and reports that she feels ill. She fails to tell SGT Charlie that she is a previous heat injury. She is directed to hydrate and to continue qualifying. PVT Echo moves on to the range, begins firing, and collapses unconscious. The medic, SP4 Whiskey, puts PVT Echo in the A/C bus, does not have Rapid Cooling supplies, and attempts to start an IV 3 times without success. He advises SGT Charlie that he needs a MEDEVAC immediately. SGT Charlie declines the request, stating a MEDEVAC will close the range, throwing off the training schedule, and he will get in trouble if he has an heat injury on the range. SP4 Whiskey loses PVT Echo’s pulse and starts CPR, requesting a MEDEVAC again. SGT Charlie requests the MEDEVAC.
- **<u>Conduct an AAR</u>**.:
  - ❑ What actions IAW the Risk Management process should have been taken?
  - ❑ What actions should you as the senior leader on the ground take NOW?

Additional Information

Links to Army Policy statements, heat injury references, TRADOC Policy, and Heat Injury Prevention Products are available on the Public Health Command Heat Illness Prevention webpage at

http://phc.amedd.army.mil/topics/discond/hipss/Pages/default.aspx

Also – see the TRADOC Surgeon Heat Risk Manual at http://www.tradoc.army.mil/SURGEON/Pdf/Heat%20Risk%20Manual.pdf

Questions?